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**STEERABLE SURGICAL SNARE****FIELD OF THE INVENTION**

The present disclosure relates generally to medical devices, and more particularly to surgical snaring instruments.

**BACKGROUND OF THE INVENTION**

Common surgical techniques make use of guide wires, catheters, stents, and other medical devices that may be placed within the body lumens of a patient. Such medical devices may occasionally break or fragment during installation, use, or retraction, thereby releasing all or a portion of the device into the patient's vascular system or other body lumens. In still other surgical procedures, sponges, gauze, or other medical materials may be inserted into an organ or vascular space, and left behind after surgery.

Medical devices or materials that fragment, break or are left behind in surgery are foreign to the body. In many circumstances, such foreign bodies may need to be removed for the patient's safety, health, or well-being. For instance, a foreign body may move through the bloodstream and potentially contribute to thrombosis, sepsis, arrhythmia, or a number of other complications. Accordingly, when an undesired foreign body is detected within a patient's organs or vasculature, it is typically desirable to remove the foreign body from the patient.

To remove the foreign body, a surgeon may resort to an open surgery technique; however, open surgery is often expensive, time consuming, and traumatic to the patient. Open surgery will often require longer healing times and result in greater risks of complications when compared to other, less invasive techniques. The risk of complication can increase if the patient has recently undergone another surgical procedure.

**BRIEF SUMMARY**

Example embodiments within the present disclosure relate to surgical devices and methods. Additional example embodiments of the present disclosure may relate to devices, assemblies, and methods for using a steerable snare to remove foreign bodies or other objects from a patient.

According to one exemplary embodiment, a surgical snare is described and includes a steerable deflection portion with a steerable distal tip. An interface may be linked to the deflection portion to provide for selective manipulation of the distal tip. A snare loop disposed at the distal tip may have a first length. As the distal tip is selectively deflected, the snare loop may also move between positions and the length of the snare loop at the distal tip may remain substantially constant.

In some embodiments, a steerable deflection portion may include a flexible elongate body. The body may be positioned between an interface and a distal tip. The distal tip may be configured to deflect substantially independently of the flexible body, and in response to selective manipulation of the interface.

In other embodiments, a distal tip may be a deflection tip that deflects by selectively bending between about zero degrees and about ninety degrees. In still other embodiments, the distal tip may deflect by selectively bending up to one-hundred eighty degrees or even up to three-hundred sixty degrees. A snare loop proximate the deflection tip may also selectively deflect a corresponding amount between about zero and about ninety or about one-hundred eighty degrees.

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A surgical snare according to some embodiments includes a steerable deflection portion having a core wire. The core wire may be linked to an interface and can extend between the interface and a deflectable distal tip. Optionally, a deflection wire is located at the distal tip and configured to restrict compression of the steerable deflection portion and instead cause the steerable deflection portion to bend in response to a force applied to the core wire. The distal tip may deflect about the deflection wire such that the deflection wire is proximate an external curve of the distal tip in response to an interface applying the force to the core wire. To facilitate deflection, a steerable deflection portion may include a coiled shaft. The coiled shaft optionally has a tight coil and a loose coil. The loose coil may be proximate the distal tip of the surgical snare.

According to another example embodiment, a surgical snare is disclosed that includes a flexible body and a deflecting tip. The flexible body may define an axis and the deflecting tip may include a first and second state. A core wire may extend along the axis of the flexible body. A distal end of the core wire may be at least indirectly coupled to the deflecting tip. An interface linked to the proximal end of the core can selectively change between first and second positions. At a first position, the interface may cause the deflecting tip to be at the first state, and at the second position the interface may cause the deflecting tip to be at the second state. The second state may be at least ninety degrees offset from the first state. A snare loop coupled to the deflecting tip, and extending at least partially longitudinally relative to the flexible body, may be configured to move at least about ninety degrees as the deflecting tip transitions from the first state through the second state.

According to one embodiment, the core wire may be attached directly to a deflecting tip. Optionally, the deflecting tip may include a coiled shaft and a deflection wire. The deflection wire may be arranged to cause the coiled shaft to flex rather than compress as the interface moves between the first and second positions. The snare loop may also have a length that remains substantially constant as the snare loop moves in concert with the transition of the deflecting tip from the first state through the second state. The snare loop may be directly secured to the core wire, the flexible body, or the deflecting tip.

According to another embodiment, a method is disclosed for capturing an object through a body lumen. In the example method, a guidable snare may be extended through a body lumen to a location proximate an object. The guidable snare may include an elongate body, a deflectable tip coupled to the elongate body, and a snare loop portion linked to the deflectable tip. The snare loop may move between positions as the deflectable tip selectively deflects, and may also maintain substantially its same shape, length, width, or other dimension or configuration during such transitions. The object may be engaged with the snare loop portion by selectively deflecting the deflectable tip to at least partially cause the snare loop to transition from a first position to a second position. At the second position, the snare loop portion may extend around at least a portion of an object while maintaining its same shape, length, width, or other dimension or configuration.

According to another embodiment, a guidable snare may be extended through a catheter or other delivery tube and through a body lumen. The snare loop portion of the guidable snare may extend out a distal opening in the introduction or delivery tube. The guidable snare may also be retracted into the delivery tube. In retracting the guidable snare, the snare loop portion may have its shape changed as the snare loop portion is tightened around the object before the snare loop portion and/or object is retracted into the delivery tube.